

Coleman Creek Consulting, Inc.

INITIAL RADON AIR SAMPLING OF MALIN ELEMENTARY SCHOOL FOR KLAMATH COUNTY SCHOOL DISTRICT 2845 GREENSPRINGS DRIVE, KLAMATH FALLS, OREGON

INTRODUCTION

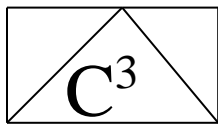
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose of the initial radon air sampling was to collect radon air samples from all regularly occupied rooms within school buildings, with the exception of storage, restrooms, kitchen, locker rooms, and compare analytical results with the EPA recommended “Action Level” concentration for radon. Short-term radon air sampling was selected for this project.

RADON INFORMATION AND HEALTH EFFECTS

Radon is a naturally occurring radioactive gas that is produced by natural deposits of uranium in soil, and is found world-wide. Uranium naturally decays into Radium, and Radium can produce Radon gas. Radon gas can travel up through soil and enter buildings in contact with soil. Radon gas entering a building may become concentrated in the lowest part of the building in areas with little fresh air mixing. If radon is inhaled into lungs, particle decay processes can release radiation, potentially damaging lung tissue, and over time leading to lung cancer. The Environmental Protection Agency (EPA) has estimated that Radon is the primary cause of lung cancer among non-smokers. EPA recommends reducing the concentration of Radon in indoor environments to below the Action Level of 4.0 pCi/L (pico-curies per Liter of air).

INITIAL RADON AIR SAMPLING

David W. Fawcett of CCC trained KCS D employees, including school custodians in radon sampling procedures December 4, 2020. Phil Beasley, Malin Elementary School (MES) Custodian placed radon air test kits in the MES buildings at the beginning of the day, December 7, 2020. A total of 22 locations were sampled according to guidelines established in the Oregon Health Authority (OHA) “Testing for Elevated Radon in Oregon Schools, A Protocol and Plan”, dated 2016. Mr. Beasley returned to MES December 10, 2020, at the beginning of the day, and collected all radon test kits placed for sampling. See Radon Air Sample Record Sheet (page 4) for locations of all areas sampled. All samples collected were packaged by Mr. Fawcett, and sent overnight to Air Chek, Inc., in Mills River, North Carolina for analysis.



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LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from MES building were reported ranging from <0.3 to 0.9 pCi/L (picocuries per liter of air). A complete listing of laboratory results and locations is found in the Air Chek, Inc. Laboratory Analysis Report in Appendix A.

QUALITY ASSURANCE

To ensure that test results are reliable and accurate, quality assurance samples, including duplicate test kits (placed in same room), blank test kits (not sampled at all), and spike sampling (exposing test kits to a measured amount of radon prior to laboratory submission) were all employed during Radon sampling. The number of duplicate, blank, and spike test kits utilized during sampling followed OHA testing protocol guidelines.

DUPLICATE TEST KITS

Two duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheet. The two duplicate test kit sets were all reported with <0.3 pCi/L. When compared with matched pair or “duplicate” test kits, both pairs were well within the expected range of 0-25% Relative Percent Difference, with identical reported <0.3 pCi/L Radon concentrations.

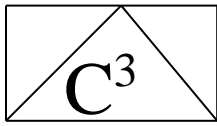
BLANK TEST KITS

One blank test kit was submitted to Air Chek with the other MES Radon test kits. The blank test kit was reported with <0.3 pCi/L. The blank test kit was reported none detected for Radon.

RADON RESULTS AND FUTURE ACTIONS

The 2016 OHA Testing of Elevated Radon in Oregon Schools Protocol and Plan describes future steps to take based on initial Radon sample results. The following is a description of recommended actions based on Radon concentrations reported.

1. If <2.0 pCi/L Radon is reported, ORS 332.166-167 requires Radon re-test every 10 years.
2. If 2.0 pCi/L to 4.0 pCi/L Radon is reported, consider lowering the Radon concentration in the room.
3. If 4.0 pCi/L to 8.0 pCi/L Radon is reported, perform follow-up Radon measurement in the affected room(s) using a long-term test. Conduct over the school year as much as possible. If that result is equal to or greater than 4.0 pCi/L, Radon concentration in the room should be lowered.
4. If equal to or greater than 8.0 pCi/L Radon is reported, conduct a second short-term test and average the result with the initial Radon result. If the average result of the two short-term tests is equal to or greater than equal to or greater than 4.0 pCi/L, Radon concentration in the room should be lowered.



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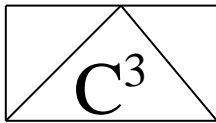
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Malin Elementary School building was reported with Radon concentrations ranging from <0.3 to 0.9 pCi/L. All Radon test kit samples were reported < 2.0 pCi/L, indicating that a re-test should be performed in 10 years.

CCC appreciates the opportunity to provide initial radon air testing and consulting to Klamath County School District.

Sincerely,

David W. Fawcett
Director of Consulting Operations



Coleman Creek Consulting, Inc.

RADON AIR SAMPLE RECORD SHEET

SCHOOL: Malin Elementary School
ADDRESS: 2153 3rd Street
Malin, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Phil Beasly

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418507	Main		1 – Office	0630	0631
9418508	Main		2 – Principal Office	0635	0633
9418509	Main		3 – Health Room	0640	0635
9418510	Main		4 – Break Room	0645	0638
9418511	Main		5 – Copy Room	0650	0640
9418512	Main		6 – Camera Room	0655	0642
9418513	Main		7 – Media Center	0700	0645
9418514	Main		8 – Gym Office	0705	0648
9418515	Main		9 – Gym	0710	0651
9418516	Main		10 – Gym	0715	0653
9418517	Main	Yes	10 – Gym	0715	0654
9418518	Main		11 – Gym	0720	0655
9418519	Main		12 – Cafeteria	0725	0700
9418520	Main		13 – Room 20	0730	0704
9418521	Main		14 – Room 19	0735	0706
9418522	Main		15 – Room 15	0740	0710
9418523	Main		16 – Room 11	0745	0712
9418524	Main		17 – Room 13	0750	0714
9418525	Main		18 – Room 17	0755	0716
9418526	Main		19 – Room 1	0800	0720
9418527	Main		20 – Room 2 Office	0805	0725
9418528	Main	Yes	20 – Room 2 Office	0805	0726
9418529	Main		21 – Room 3	0810	0730
9418530	Main		22 – Room 9	0815	0735

Comments: **Spike Sample =**
Blank Sample = 9418531

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:**MALIN ES****20570800**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418507	OFFICE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418508	PRINCIPAL	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418509	HEALTH	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418510	BREAK RM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.7 ± 0.4	2020-12-15
9418511	COPY RM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418512	CAMERA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418513	MEDIA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.9 ± 0.4	2020-12-15
9418514	OFFICE	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418515	GYM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418516	GYM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418517	GYM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418518	GYM	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418519	CAFETERIA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418520	20	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418521	19	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418522	15	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418523	11	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418524	13	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418525	17	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418526	1	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418527	2 OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418528	2 OFFICE	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418529	3	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418530	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418531	9	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15

APPENDIX B

BOWSER-MORNER RADON SPIKE EXPOSURE

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT Coleman Creek Consulting, Inc. Job Number 198582

NOMINAL Conditions: Radon Conc 25.7 pCi/L Rel. Hum 59.0 % Temp. 70.3 F

Date Start: 12/4/20 Date Stop: 12/7/20 Date Start: _____ Date Stop: _____

Time Start: 0923 Time Stop: 0923 Time Start: _____ Time Stop: _____

(Group 1)

Device No.'s: (12) Char Bags -

9417935, 9417970, 9418007,

9418060, 9418096, 9418127,

9418163, 9418190, 9418226,

9418250, 9418286, 9418321

Device No.'s: _____

R5 Left

Date Start: ^{rem} 12/4/20 Date Stop: 12/7/20 Date Start: _____ Date Stop: _____

Time Start: 0927 Time Stop: 0927 Time Start: _____ Time Stop: _____

(Group 2)

Device No.'s: (13) Char Bags -

9418370, 9418418, 9418465, 9418500,

9418566, 9418601, 9418660,

9418695, 9418771, 9418747,

9418806, 9418846, 9418875

Device No.'s: _____

R5 Right

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

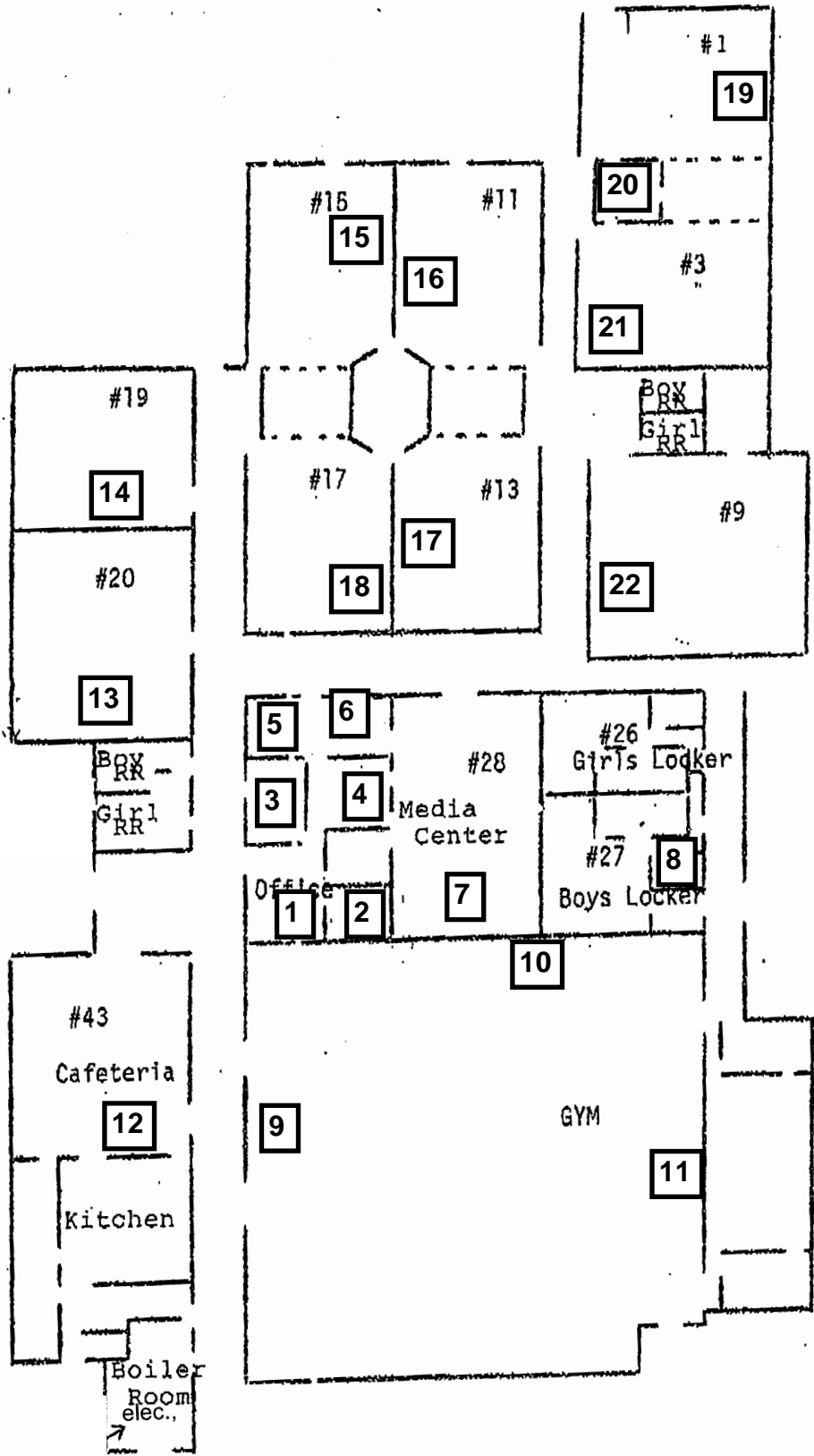
Device No.'s: _____ Device No.'s: _____

Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

APPENDIX C

RADON SAMPLING LOCATION DIAGRAM

MALIN ELEMENTARY SCHOOL Radon Sample Locations



12 = Radon Test Kit Location